MA BRFSS Methodology (updated March 2013)

The Massachusetts BRFSS is a health survey of Massachusetts adults which has been conducted since 1986. The survey began as a landline telephone survey; however, a cell phone survey was piloted in 2008 and a mail survey was piloted in 2010. This methodology is designed to more efficiently and validly reach the population of Massachusetts to provide population estimates of health conditions and behaviors. Details about the methodology of the landline survey and the cellular telephone survey are below.

Landline Survey

To better address state-specific needs, the Massachusetts BRFSS landline sample has consisted of three survey splits since 2000. Each split contains state-added questions or optional CDC modules about health topics relevant to Massachusetts residents. To preserve the quality of the data, CDC requires states that implement multiple survey splits to have a sample size of at least 2,500 respondents per split. Massachusetts has exceeded this recommended sample size each year since the implementation of multiple survey splits.
The landline survey is a random-digit-dial (RDD) telephone survey of non-institutionalized Massachusetts adults residing in households with telephones. The sampling of the survey population involves a list-assisted, stratified RDD sampling frame, which assures that Massachusetts households with telephone numbers assigned after publication of the current directories, as well as households with deliberately unlisted numbers, are included in the sample in appropriate proportions. Telephone numbers are randomly selected, and multiple attempts are made to reach each household. To be eligible to participate in the landline telephone survey, a household must be occupied by at least one adult aged 18 and older. Institutions, group quarters, and temporary residences lived-in for less than one month per year are ineligible for the landline survey, however; college housing was included as a private residence beginning in 2012. In order to provide estimates of health at the local level, additional interviews are conducted among adults residing in the following major cities in the

Commonwealth: Boston, Worcester, Springfield, Lowell, New Bedford, Brockton, Lynn, and Quincy. Every three years, Brockton, Lynn, and Quincy are rotated with Lawrence and Fall River.

Once a household is contacted, one adult is randomly selected to complete the interview. No proxy respondents or substitutions are allowed in the event that the selected adult was unwilling or unable to complete the interview for any reason such as language barriers, disability, or lack of availability. In addition to English, the survey is conducted in Spanish and Portuguese. The sample size of the survey has changed over time (See Table 1).

Cellular Telephone Survey

Telephone numbers are randomly selected, and multiple attempts are made to reach each cellular telephone number. To be eligible for the cellular telephone survey, the respondent must be aged 18 or older. During 2008-2011, 'cell-only' respondents were used for the cell-phone sample. That is, people who only used a cell-phone and did not have a landline. In 2012, this was changed to 'cell-mostly' respondents, defined as those receiving at least 90% of calls on their cell-phone. The cellular telephone survey is conducted in English, Spanish, and Portuguese. As with the landline survey, no proxy respondents or substitutions are allowed in the event that the selected adult was unwilling or unable to complete the interview for any reason such as language barriers, disability, or lack of availability.

Table 1. Sample size estimates over time

	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Landline sample size	7,580	8,203	8,906	12,726	21,507	20,581	16,731	16,311	20,492
Cell phone sample size	x	x	x	x	x	1.5% 271	1.5% 266	3.5% 594	8.2% 1,836

Data Analysis and Weighting

Each respondent has a unique probability of selection of being included in the survey. Because of differential probability of selection and demographic adjustment, each respondent is assigned a 'weight'. This weight should always be used in running data analyses, if your goal is a valid estimate of the Massachusetts population frequency of a given variable. The sum of weights adds up to the size of the state adult population.

In 2011 the BRFSS weighting methodology changed from Post-Stratification to Raking. Post-Stratification was used for many years, but Raking will now be the only method used for weighting BRFSS data. Raking is an improved methodology that uses more demographic variables to adjust the data including: telephone source, education level, marital status, and renter/owner status. These are used in addition to gender, age, and race/ethnicity which were used in Post-Stratification. Since the two methodologies use different variables for adjustment, there may be slight differences in prevalence estimates when comparing Post-Stratification to Raking**. Because of this, it is not recommended that 2011 BRFSS data with Raking weights be compared to earlier years of data with Post-Stratification weights. This will also not allow for trend analysis that includes 2011 and prior years.**

The inclusion of cell-phone data in the final data file began in 2011, which may also contribute to differences in prevalence estimates. Beginning in 2011, a new weight variable was created for the combined landline and cell-phone sample, with a separate weight for the landline only sample.

More details on Raking weight and its effects on prevalence estimates are available in our 2011 BRFSS report and on the CDC website:

http://www.mass.gov/eohhs/docs/dph/behavioral-risk/report-2011.pdf

http://www.cdc.gov/surveillancepractice/reports/brfss/brfss.html

Post-Stratification Weights (2010 and earlier)

- **finalwt:** This weight variable is the most common, and often most appropriate variable to use in general analyses of the data.

Split weights (from 2008)

- **finalq1** – weight for questions on split 1
- **finalq2** – weight for questions on split 2
- **finalq3** – weight for questions on split 3

Raking Weights (2011 and later)

- **LL_raked** – weight for landline sample
- **LL_Q1** – weight for questions on split 1
- **LL_Q2** – weight for questions on split 2
- **LL_Q3** – weight for questions on split 3
- **LLCP_raked** – weight for combined landline and cell phone sample

All analyses are conducted using SAS software version 9.3 and SUDAAN version 11. These statistical tools allow us to correctly calculate weighted percents with 95% confidence intervals, which are considered estimates for the adult population in Massachusetts. Since the survey represents a random sample of the population, and not a complete census, 95% confidence intervals provide a range of values that most likely contain the true percent estimates for the population.

Limitations

There are some limitations that should be considered when interpreting results from the BRFSS. Households that do not have a telephone do not have the opportunity to participate in the survey. All data collected by the BRFSS are based on self-report from the respondents. By its nature, self-reported data may be subject to error for several reasons. An individual may have difficulty remembering events that occurred a long time ago or the frequency of certain behaviors. Some respondents may over report socially desirable behaviors, while

underreporting behaviors they perceive to be less acceptable. Finally, because the BRFSS surveys a randomly selected sample of Massachusetts adults, these results may differ from another random sample to some extent simply due to chance.

Persons with the most severe limitations and with certain disabilities are not represented in this sample since individuals living in institutions are not included in the BRFSS.

A substantial percentage of households contacted to participate in the landline BRFSS do not complete the survey. Although households are telephoned on repeated occasions, interviewers are not always able to reach the randomly selected adult in the household. In addition, some adults contacted do not agree to participate in the survey. To the degree that respondents who participated in the survey differed significantly from those not included in the survey, bias is present in the results. The weighting of the data partially takes into account this non-response.

For some cellular telephone numbers with a Massachusetts area code, the respondent may live outside of Massachusetts. In this case, data for only the core questions is sent to the state that the respondent currently resides in. This also applies to other states that may get a Massachusetts resident in their cell-phone sample. The core data for these respondents will be sent to us in Massachusetts. State-added or optional module data is not included since these questions vary from state to state.